THE EVOLUTION OF RUSSIAN MACRO-LEVEL MANAGEMENT – THE CASE OF ENERGY EFFICIENCY POLICY

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Abstract

Background. The paper gives a critical overview of macro-level management efforts to increase energy efficiency in Russia in 1995-2013 with special focus on the shift in goals, methods and approaches. We compare the pace and the trend of evolution of Russian energy efficiency policy with world trends and discuss the effects of policy diffusion on international and regional levels.
Research aim. Using the conceptual framework of an extended energy-efficiency gap, this study investigates the existing barriers to energy efficiency and suggests the possible solutions for improvement of energy policy on regional level.
Method. We gathered the information for evaluation of effectiveness of current energy policy by empirical research in the form of a mix of medium-scale face-to-face inquiries and semi-structured interviews.
Key findings. The findings reveal that the most common barrier is the lack of expertise and competences to identify the inefficiencies, and opportunities to implement energy efficiency measures needs to be overcome first for further improvement of energy efficiency. The convergence of expertise can happen through horizontal interactions on regional level as well as specially organized training programs at the federal level with the participation of international experts.

Keywords: Energy management, Policy review, Policy diffusion, Barriers, Macro-level management

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INTRODUCTION AND BACKGROUND

At this time, energy management has become one of the most important topics in many industrialized countries. It is a focus of management efforts not only in individual companies, but also in regional, national and even international policies. In recent decades EU countries have achieved significant improvements in their energy efficiency thanks to intensive diffusion of best management practices among firms, countries and peer groups. But many less integrated in "Europeanization processes" countries are still struggling with main problems in energy management. Policies of energy efficiency recently launched in the Russian Federation resulted in impressive GDP energy intensity and corresponding GHG – intensity decline, but

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there is still a significant energy-efficiency gap, which has been widely investigated in the literature on empirical evidence from other countries (Jaffe & Stavins, 1994; de Almeida, 1998; Eyre, 1997; Brown, 1995;) and Russia (Martinot, 1998; Fromme, 1996).

A vast literature basis in Russian addressed outcomes of policy efforts to increase energy efficiency considering different time periods since 1995, which are usually easily visible, notably when measured by decreasing energy intensity of GDP or absolute decrease in the use of fuel. At the same time, the underlying dynamics in policy-making, the pace and the trend of evolution of Russian energy efficiency policy and the issues of dependence of policy choice on international diffusion effects are much harder to observe and explain. This is the research gap we address in this paper.

METHOD

Theoretical Framework

We use the typology of EEP, proposed by Tanaka (2011), which introduced three main types of policies – prescriptive, economic and supportive. His categorization and assessment criteria help to observe existing energy efficiency policies for industry, commercial and residential sectors and also help to compare the pace and the trend of evolution of goals, approaches and instruments of Russian EEP with world trends. For evaluation of effectiveness of EEP we use a simplified approach which is based on the rate of reduction of energy intensity of national (or in some particular cases, regional) economy (the energy used per level of production output) and the rate of reduction of CO_2 emissions. We also evaluate the effectiveness of EEP by the proportion of adopted energy efficient measures (EEMs) introduced in EEP and explain the non-adoption (or delayed adoption) of EEM under the commonly used concept of barriers to energy efficiency (DeCanio & Watkins, 1998; Jaffe & Stavins, 1994; Sorrell, Mallett, & Nye, 2010).

In explaining government' policy choices we study how they are influenced by domestic factors (e.g. characteristics of domestic political institutions or income levels) and international policy diffusion, which was thoroughly investigated in existing theoretical and empirical literature (Schaffer & Bernauer, 2014; Bernauer, Kalbhenn, Koubi, & Spilker, 2010; Holzinger, Knill, & Sommerer, 2008; Ward & Cao, 2012; Busch & Jörgens, 2012; Perrin & Bernauer, 2010).

Sources of Information and Methods

The main sources of information about Russian EEP goals as well as characteristics of specific EEMs can be found in state and regional legal acts. We have analysed more than 270 legal acts, passed in 1995-2013: (a) Fed-

eral EE laws (1996, 2009); (b) Federal EE programs (1998-2001, 2002-2005, 2010-2013); (c) Energy Strategies of Russian Federation (1995, 2003, 2013); (d) Regional EE laws, passed in 1998-2010; (e) Regional EE programs, passed in 1996-2013; (f) Regional legal acts, dealing with some issues on EE. The basic principles and measures of energy conservation and energy efficiency policy are presented in federal laws (FL) on energy efficiency (1995, 2009). However, the provisions of these issues have only been really supported by Federal Programs on energy efficiency (1998, 2001, 2013). Thus, the transition of the policies' primary purposes can be seen in ES and FL, but the real shifting in focus can be evaluated only through joint-comparative analysis of all these official papers.

Russian regions differ greatly in climate, structure of economy and characteristics of regional energy systems; therefore, they definitely cannot be treated as a homogenous aggregate. Thus, we provide an insight into evolution of regional EEP in 2006-2013 using the case of Krasnodar Region.

Since the study captures a long period of time we used different sources of information for evaluation the effectiveness of EEPs. Legal acts with thorough analysis of previous EE efforts, statistic bulletins and a vast literature basis both in English and in Russian are available for the period of 1995-2010, but not for 2011-2013. It is too early to evaluate the effectiveness of new EEMs, introduced in 2011-2013 by macroeconomic indicators. Therefore, we gathered the information for evaluation of effectiveness of current EEPs by empirical research in the form of a mix of medium-scale face-to-face inquiry and semi-structured interview. Talking personally to the experts in EE issues was considered to be the best way to understand their opinion deeper and ask some additional questions if needed. It gives the survey some features of a case study (Yin, 2002), with both quantitative and qualitative paradigms.

The first part of the questionnaire has 12 questions (Q1-Q12), framed in such a way that the respondents were able to estimate the most obvious barriers for energy-efficiency. For each question, the respondent put his assessment on a five-point Likert scale. Interviews on additional questions normally lasted 20-30 minutes, and were digitally recorded and transcribed. There were a total of 44 interviews, taking place in January – May 2014. The numbers interviewed reflected the need to reach so called "saturation" point (Guest, Bunce, & Johnson, 2006), when no new data relevant to the research topics is emerging in additional interviews.

The answers to the first part of the questionnaire were processed with a non-parametric statistical test because of the small size of the sample and estimations in weak scales. The transcripts were analysed and coded using a grounded theory approach, in which the topics that are common across the interview transcripts are identified.

RESULTS

Russian Energy-Efficiency Management In 1995-2005: Federal Level

The main task of the country's energy policy proclaimed in the first Energy Strategy (1995) was restructuring of the fuel and energy complex (FEC). Environmental and EE-goals were mainly represented by the increase in the share of natural gas in the total consumption as the most economically and environmentally effective organic source of energy.

The first Federal Law "On energy efficiency" #28 (April 3, 1996) had a declarative nature and hardly any proposed EE measures were implemented in Russia, but was the first official document enshrining in law the concept of "energy saving". The law covered the following topics: (a) basic principles of EEP; (b) the issues of standardization, metrology and certification in the field of energy saving; (c) mandatory registration of the entire volume extracted, produced, processed, transported, stored and consumed energy resources since 2000; (d) mandatory of state statistical monitoring of the consumption of energy resources and their effective utilization; (e) possible sources of financing EE-programs; (f) the need for harmonization of the standards of the Russian Federation with the international standards, as well as mutual recognition of certification; (g) promotion of EE-technologies and methods.

According to the typology of EEP, proposed by Tanaka (Tanaka, 2011), we can classify the policy introduced in FL as supportive with monitoring and promotion measures, but without any specific targets and, therefore, without a point for evaluation. All these missing issues as well as funding for EE-measures were marked in Federal Program on Energy Saving (FP) for period of 1998-2005 approved by the government in 1998. The main target of the FP was to save fuel and energy resources in the amount of 365-435 million tons and a reduction of energy intensity of GDP by 2005 of up to 13.4%.

The focus of this program was energy-saving in the fuel and energy complex. EE in housing was primarily considered as improvement of poor metering systems (Figure 1). The program combined prescriptive measures such as set EE-goals and preparation of conservation plans and programs on regional level, economic measures such as direct subsidies for specific investment projects and less supporting measures such as monitoring and promoting.

Funding for the program was provided in the amount of 55.3 trillions of RUB (in prices of 1997), 5% of the funds were covered by the federal budget. Remaining investments were expected to come from regional budgets, private companies, loans from Russian and foreign banks and reduction of budget subsidies to the population.

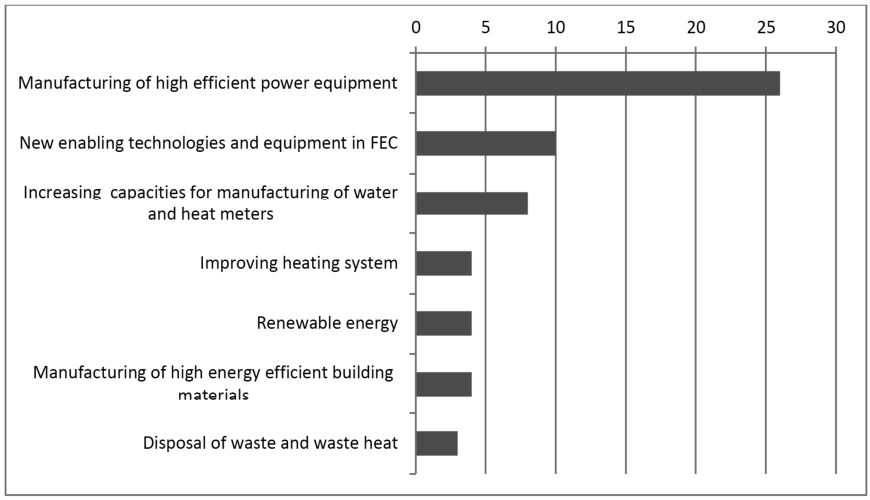

Figure 1. The Number of Investment Projects in the Main Directions of FP-1998.

Source: Author's own study.

A negative assessment of performance of FP-1998 is given in most Russian literature sources. Some of the projects failed for several reasons, mainly (a) the lack of direct support from the federal budget, which over three years was a little over 20 million rubbles, whereas the plan was for 2.55 billion; (b) weakly developed financial mechanisms for gathering investments for primary energy saving projects of the program; (c) the lack of attention and understanding on regional level (42 of 80 regions haven't developed any energy saving programs, and 50 haven't created any funds for them). Nevertheless, one of the main goals of reduction of energy intensity of GDP by 13.4% was achieved in a three years (Figure 2), while the total use of fuel (in oil equivalent) rose.

A second attempt at organizing a complex approach to energy saving on a federal level was the FP "Energy-effective economy for the period of 2002-2005 and in perspective until 2010", adopted by the government on 17th November 2001. The main goal of FP was proclaimed the creation of socially oriented energy efficient economy, providing reliable energy sources to all industries and decreasing the energy intensity of GDP by 2005 at 13.4% and by 2010 – at 26% compared to 2001 thanks to a structural rebuilding of energy-intensive branches. Other measurable goals were updating equipment in FEC at 30-70% (depending on the industry) by 2010, reduction of pollutant emissions by 1.53 mill tons in the period 2002-2005 and by 2.537 mill tons in 2006-2010, and creation of 199 thousand new jobs.

Direct subsidies were planned for prior activities in EFC, selective support industries and companies, R&D and solution of social problems. FP

includes mostly economic and supporting measures such as promotion, but economic models other than direct subsidies were not even considered.

The reduction by 26% as well as some other numerical parameters of the ES-2020 turned out to be outdated already in 2005 (Figure 2).

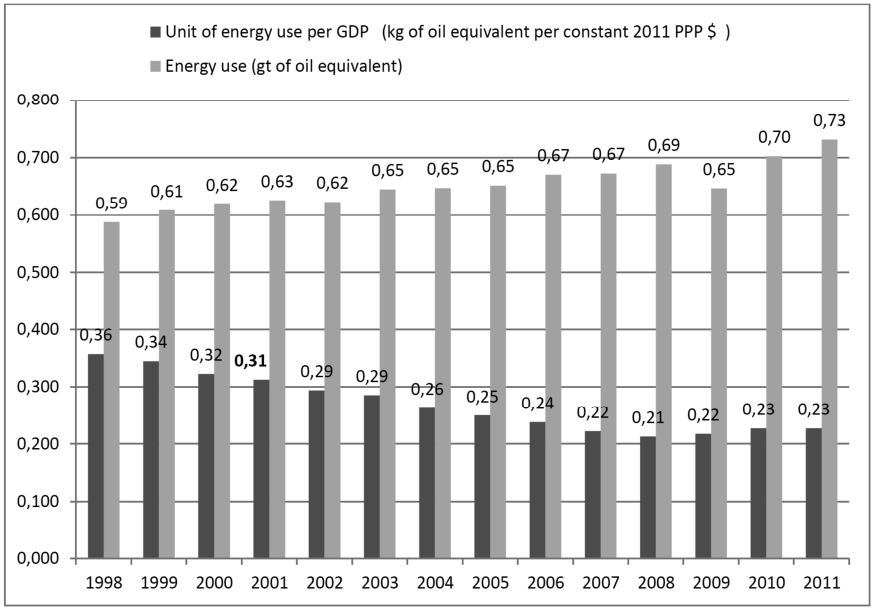

Figure 2. The Change in Energy Intensity of GDP and Energy Use in Russia in Different Periods of EEP Implementation

Source: Author's own study.

This created the illusion that the economy has become energy efficient or, at least, is on the way to the target. The official annual reports of Russian Ministry of Industry and Energy stated that by 2004 the sections "Energy efficiency of fuel complex" and "Security and development of nuclear energy" of the program were completed by 99%. They report increase in oil, gas and coal mining by 32%, 9% and 16% respectively, comparing to the 2000 level of production. Several new power plants were built and several were renovated. The total power of newly installed equipment grew for all types of plants, compared with the previous period 1995-2000 (Figure 3).

At the same time the oil recovery factor decreased from an average of 0.38 to 0.37. The pace of renovation in electricity industry was not enough to overcome the aging of equipment, which grew from an average of 30.2 years in 2000 to 33.5 years in 2005. In government report about the progress on Federal target programs in 2005 the program "Energy-efficient

economy" was classified as ineffective in the area of energy saving in consumption. It was admitted that the main reason for the failure is a weak mechanism for attraction of extra-budgetary funding. The program was stopped in 2006 and redesigned in another FP "Energy Efficient Economy for 2007-2010 and up to 2015", which, unfortunately was never implemented. Instead, the problems in the energy industry were planned to be solved through the program "Development of nuclear power complex of Russia in 2007-2010 years, and up to 2015" (Jul. 15, 2006).

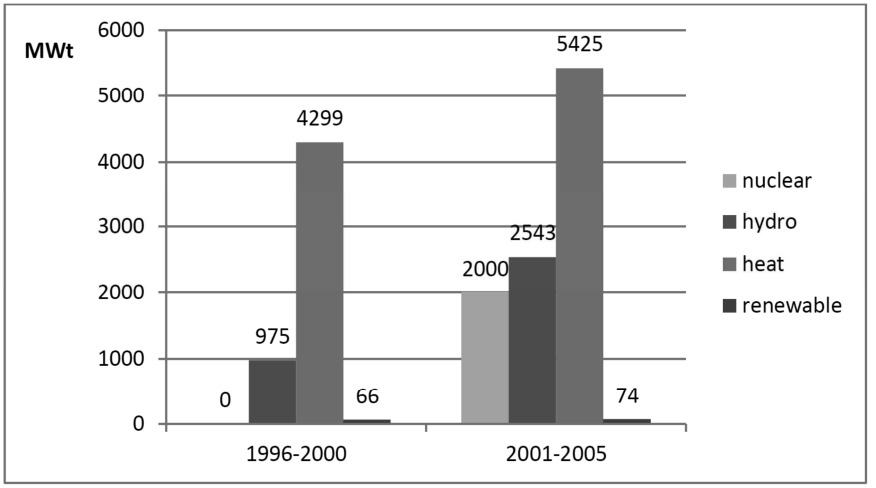

Figure 3. The Dynamic of New Power Plants Building in the Period 1996-2000 and 2001-2005

Source: Author's own study.

ES-2003 has placed much greater emphasis on market-based instruments such as progressive increase in energy prices for end-users, new electricity tariffs, which can guarantee return on investments, development of leasing and insurance systems, improvement of depreciation rules and participation in international trading on developing carbon market. Direct subsidies were restricted to priority investment projects only. ES has also emphasized the importance of introduction of new standards and rules of energy and fuel consumption, limits of energy loss and mandatory certification of energy consuming appliances and equipment.

ES-2003 has introduced new specifications of regional energy policy. It should take into account the fundamental differences in natural and climate conditions and power supply of the fuel and energy balance of macro-regions (zones) of the country, as the northern, southern and central regions of European Russia, the Urals, Siberia, the Far East and Far North

regions. Basically the same mechanisms as a state energy policy were introduced for implementation of regional energy policy.

Comparing the evolution of goals of Russian EEP in this period (1995-2005) set in ES, with the main trend of transition of objectives of policy which contribute energy efficiency improvement in IEA countries (Tanaka, 2011), one can observe the similar shift from energy conservation (aimed at absolute energy savings) to energy efficiency (aimed at reducing the energy used per level of production output) and the increasing emphasis on climate change and sustainable development. It can be treated as an evidence of environmental and energy-efficiency policy diffusion, thoroughly investigated in existing theoretical and empirical literature (Schaffer & Bernauer, 2014; Bernauer, Kalbhenn, Koubi, & Spilker, 2010; Holzinger, Knill, & Sommerer, 2008; Ward & Cao, 2012; Busch & Jörgens, 2012; Perrin & Bernauer, 2010). Primary channels for diffusion are (a) commercial and demonstration activities of international companies like Honeywell, Danfoss, IVO international and Kenetech Windpower in 1992-1995 (Martinot, 1998); (b) cooperation with IEA in the frame of Joint Declaration signed in July 1994 (IEA, 2002); (c) implementation of a pilot phase of the project-based Kyoto mechanisms (Clean Development Mechanism and Joint Implementation in 1995-2004 (Korppoo, 2005)); (d) ratification of the Kyoto Protocol in 2004; (e) growing energy-efficient technology transfer through direct foreign investments (Ratner, 2014).

The transition of two general policy approaches: from sector-specific measures to industry-wide/economy-wide measures focused on the environmental and social circumstances within which the companies and sectors operate is not so obvious. Indeed, considering sector-specific measures as regulations, directed financial instruments and agreements while considering economy-wide measures as energy taxes, carbon taxes and emission trading (Tanaka, 2011), it is difficult to notice any significant shift. But completion of federal programs on EE in 2006 clearly indicates that the first approach has exhausted. The idea of the new approach was dictated by the vast spatial inhomogeneity of the Russian economy and energy system. It consisted in authorization of the regions as intermediaries between federal government and individual companies and organizations, which can help in assessing circumstances by collecting, compiling, aggregating and communicating data which can be used for policy development and policy positions of the state.

A positive effect of federalism on adoption of environmental policies was explained theoretically in a considerable body of research (Scruggs, 2003; Levy, 2007) and recently proved statistically by Shafer and Bernauer (2014). Increasing authority of the regions provides more opportunities for policy experimentation and more room for policy diffusion processes driven by learning and competition.

The most important barriers to energy-efficiency in this time period are thoroughly investigated by Martinot (1998) and Korppo (2005). They pointed out such transaction barriers as a lack of long-term capital, the lack of information about energy efficiency and renewable energy costs, benefits, geographic resources and opportunities, technical characteristics of district heating systems, legal and institutional barriers, lack of experience and skills related to business planning, cost-minimization, innovation, marketing, finance, negotiation and competition. At the same time they claim that Russian capabilities to develop and produce most energy efficiency and renewable energy technologies are excellent. The technological infrastructure, scientific and technical knowledge, engineering and technical skills, factories and equipment are all well developed. We argue that scientific, technical and engineering knowledge and skills were slowly, but constantly deteriorating over 1991-2005 in Russia. There is a clear evidences of aging technical and engineering staff in all branches of industry, including electricity generation and transmission (Korovkin, Dolgova, Korolev, Podorvanova, & Polezhaev, 2005; Korovkin & Korolev, 2005; Korovkin, Dolgova, & Korolev, 2011; Korovkin, 2011). More than half of the graduates of technical universities got a job outside their specialty. Many scientific institutes ceased to exist. Highly trained technicians were forced to seek employment in the service sector. The average salary in scientific institutes of Russian Academy of Science in 1995-2002 was lower than average for the economy and only in 2004-2005 grew up to 300$ per month. In this situation personal investments in technical education and training become irrational.

A lot of empirical evidence of the lack of individual motivations by environmental and energy efficiency values can be found in the commonly cited World Bank Group report "Energy Efficiency in Russia: Untapped Reserves" (World Bank Group, 2008). Another important barrier, mentioned in the report, is a lack of competition in the Russian electricity industry both in generation and transmission. FL-1996 for the first time allowed independent power production in Russia, but implementation of this law in a practical manner was problematic. In the transmission sector, investors had no way to capture the savings from energy efficiency investments and were not interested in implementation of new technologies (IEA, 2005, 2006). Thus, the entry market barriers for new energy efficient products and technologies remain very high.

Russian EEP in 2006-2013: Regional Level

In 1995-2006 the regional EEP were in most cases a reflection of federal initiatives. First regional laws on energy efficiency were passed in 1996-1998 right after the FL-1996. As well as a federal policy they did not provide any effective instruments to promote energy saving and did not set

any specific goals. Some regions approved only a limited number of legal acts, dealing with particular questions of EE, such as street-lighting (Novgorodsky Region), limited energy consumption in regional government organizations (Jewish Autonomous Region, Magadan Region, Tambov Region, etc.) or an energy audit in public sector companies (Republic of Bashkortostan, Sverdlovsk Region, etc.). First regional EE-programs (1998-2003) were also very restricted in policy instruments and therefore not very effective. Regional programs of the "second wave" in 2004-2008 were more specific in development new methods of incitement and motivation and pointed out the elaboration of new market-based instruments as a prior goal. Analysing more than 260 regional EE-legal acts, passed in 1997-2008, we defined 20 instruments, which were used in different regions (Table 1).

Table 1. Instruments of Implementation Regional EEP in 1997-2008

Instrument	Type of policy	Number of regions using it
Co-financing of metering system improvements from regional, local and federal budgets and owners.	E	42
Financing regional EE-programs from the regional budget	E	40
Financing energy audit from the regional budget	E	39
Financing the EE-promotion from regional budget	S	38
Financing training from the regional budget	S	26
Organization of exhibitions of EE-equipment and technologies	S	22
Tax incentives	E	22
Creating Coordination Council (Commission) for EE-activities	S	21
Limiting energy consumption in the public sector	P	20
Transfer of money saved from EE-measures at the disposal of the budget of the organization.	E	19
Support for R & D in energy efficiency (co-financing)	E	15
Sanctions for excessive energy consumption	P	12
Creation of regional energy market	E	12
Fundraising	S	10
Warranty of regional authorities for return on money invested in EE	E	6
Advice to local authorities on the procurement and installation of metering for resources consumption.	P+S	5
Seasonal energy prices	E	5
Discount prices on energy in the period of implementation of EE-programs	E	4
Accounting the savings, resulting from EE-measures in the current year, in the process of approving the tariff for the next year	E	4
Financing EE-programs from the means of consumers	E	3

P, E and S stand for prescriptive, economic and supportive type respectively.

Source: Own elaboration.

The table shows that most popular were economic policies: co-financing of metering system improvements from regional, local and federal budgets and means of building owners, financing regional energy

efficiency programs and energy audits (mostly in public sector) from regional budget. The most extensive set of EEP were used in Moscow (16), in the Yaroslavl (13) and Tambov (12) regions. Some of the instruments of regional policy are different from those adopted in world practice and can hardly be assigned to a particular type of policy. This is due to the complexity and lack of transparency in budget and other relations between the federal, regional and local authorities, and the traditionally dominant role of the state in the economy.

A quite impressive decline in energy intensity of regional GDP (GRP) in many Russian regions can be explained as a result of the first period of regional EEP implementation (Figure 4). But, as shown in numerous studies (Bashmakov & Myshak, 2014), it was mostly driven by structural factors with "very limited contribution of technological innovations".

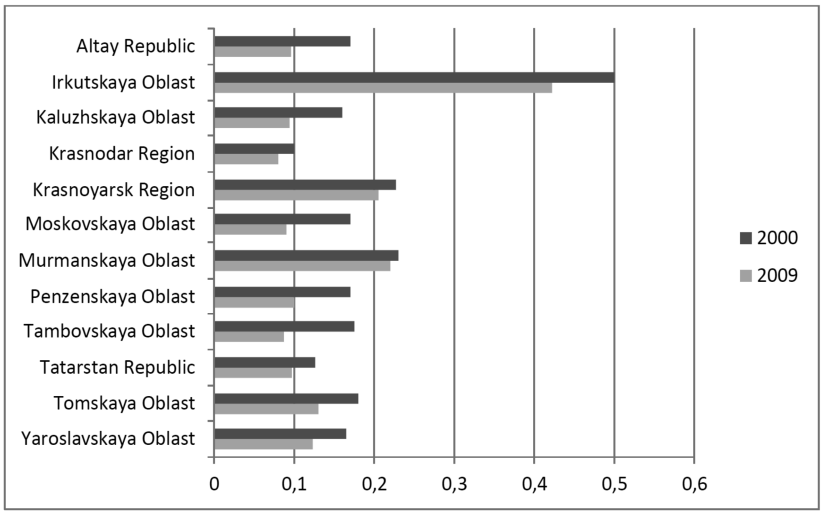

Figure 4. Changing in Electrical Energy Intensity of Some Regional GDP during 2000-2009 (mill kWh/thous. rub)

Source: Author own study.

The difference in performance of Russian regions in EEP depends on many factors, such as heterogeneous climate and infrastructural conditions, structure of economy, accumulated depreciation in industry and last, but not the least, the quality of regional management.

The next push to development of EEP on regional level was initiated with adoption of FL "On energy saving and energy efficiency" #261 in November 2009. FL-2009 has brought some new points into state EEP, such as specific obligations of the federal government to co-finance regional EE-programs, as well as the following conditions for receiving subsidies: (a) the presence of approved regional EE-program; (b) co-financing EE

measures from the budget of the region; (c) high rates by criteria that reflect initial conditions and effectiveness of the implementation of the regional program of energy saving (in order to continue subsidies).

FL-2009 gave a start for the new period in regional EEP. 8 new regional programs were launched in already in 2009. In 2010 they number achieved 48 (about 60% of all regions). In 2011 only 11 regions or Russian Federation did not have EEP.

At the end of 2010 the new FP "Energy saving and increasing of energy efficiency until 2020" was launched. A new mechanism of replication of the best projects carried out at the regional level was added to the existing set of EE instruments. Thus, the focus of EEP remains at regional level, except specific tasks in fuel energy complex (increasing the depth of oil refining, oil recovery factor etc.).

The new legislation fully came into the force in 2011-2012. At the same time the federal standards in the field of energy efficiency were updated and harmonized with international standards ISO 50001:2011 "Energy management systems". This time period is also marked by intensification of Russian participation in Joint Implementation (JI) mechanism projects (World Bank Group, 2012).

Financing of regional EE-programs from the federal budget according new conditions began in 2011. In 2011-2013, 66 out of 80 Russian regions were funded with 1.667 million RUB in total, but only 18% of them have achieved expected economical results. Almost 30% of the regions were financed by the federal government only once (in 2011) and then their spending was considered ineffective. Top-12 regions by the total amount of subsidies, received from the federal budget, are presented on fig.4.

Therefore, in 2006-2013 the focus of Russian EEP has significantly shifted to the regional level. It provided more room for policy-experimentation within each region, competition among regions and wealth of opportunities for information exchange in a wide range of policy-areas, including renewables policy. The influence of international factors has grown. The adoption and nationalization of ISO 50001:2011 has introduced best energy management practices and experience of other countries in development of EEPs. JI projects brought not only investments for implementation of EEP, but lacking expertise and competences. For further study we conducted a case-study of EEP in Krasnodar region.

The Case of Krasnodar Region (Krasnodarskyi Krai)

First regional EE-law was adopted in 2001 and then updated 4 times (twice in 2002, in 2008 and 2009). Basically, all version of regional law just repeated the statements of federal laws and included the issues of authorities division between local and regional levels. Real policy instruments were sharpened in regional EE-programs.

In 2002-2010 region has implemented three EE-programs (2002-2005, 2006-2008 and 2009-2010), which caused the total reduction on energy-intensity of GRP by 8%. About 400 energy-saving projects with total investments 3.5 billion rubles were implemented in various sectors of the regional economy. The main financial source was the own funds of the companies (as in most regions of Russia). Thus, the program for 2002-2005 did not provide any finance from the regional budget at all, the program of 2006-2008 provided about 1% of total prospected investments, the program of 2009-2010 – 0.6% of total prospected investments. Key areas of implementation of the programs were (a) creating on-line automated information systems for commercial electricity metering; (b) modernization of existing and construction of new boilers; (c) reconstruction of outdoor lighting systems with replacement of transmission lines and the installation of energy-saving lamps; (d) introduction of renewable energy sources (mostly, solar collectors); (e) improvement of metering systems in organizations of public sector and residential sector. The main bottleneck of these programs was a lack of marker-based instruments for promotion of energy efficiency. Lean financing from the regional budget was not enough for a thorough change of situation.

In 2010 the new regional law "On energy saving" was adopted (a year after adoption of the new FL-2009 "On energy saving"). It covered such topics as authorities in the field of energy-saving, energy labelling of produced and imported goods, energy passports for buildings, improvements of metering system in dwelling areas, energy audits algorithms and documentation.

The new Regional Program "On energy saving and increasing of energy-efficiency on the territory of Krasnodar Region for the period 2011-2020" was designed with the consideration of best world and other regions practice in related areas. It provides a more thorough analysis of regional top EE-problems and introduces some new market-based policy instruments:

1. Allocation of funds from the regional budget to municipalities on a competitive basis for the co-financing of specific projects;
2. Development and presentation of business plans in the Russian investment fund, fund of assistance to reforming residential sector, the European bank for reconstruction and development, World Bank;
3. Joint implementation projects, defined in article 6 of the Kyoto protocol;

The means of regional budget comprises about 2% of total prospected investments and provided for renovation of old energy intensive equipment in public and residential sector, energy audit of government organizations, creation of pilot EE-objects for promotion new technologies (most-

ly geothermal power plants and systems) and development of market incentives for energy saving.

In 2011-2013 the region is one of the top-12, receiving subsidies from federal budget due to high level of regional EE-management. Nonetheless, the significant reductions in energy consumption did not happen, furthermore, some indicators there is an increase of energy consumption. In 2012 per capita consumption of electricity in the region increased from 3,991 to 4,002 kWh. Unlike the scheduled, EE-projects were financed mostly from regional budget with total investments made up only about 3% of scheduled.

In 2013 regional authorities launched the program of subsidizing SMEs for implication of energy saving projects. To date the subsidies (from 500,000 to 3,000,000 RUB) are available for the following activities of SMEs:

1. Staff training on the EE-issues of energy efficiency, including introduction ISO 50001;
2. Energy audit;
3. Introduction of energy management system and certification according to ISO 50001;
4. Acquisition of energy efficient technology and equipment;
5. Lease or interest payments for EE-projects.

It is too early to evaluate the effectiveness of this new instrument by economic indicators. But it is already clear that the program will be not as successful as planned. In some areas (for instance, the development of renewable energy) the lag behind the plan is so much as to be regarded as a failure of implementation. A thorough analysis of literature and legal acts, unfortunately, did not help to accurately identify and assess the EE-barriers, therefore, we decided to conduct an empirical study with semi-structured interview. The questions of the first part of survey and barriers addressed are presented in Table 2.

The second part of the questionnaire represented by a small set of carefully targeted but open-ended questions (totally 5 questions) that allowed the interviewee to respond fully and freely, so that new things were heard which might not have been uttered if the questions were too narrowly restricted or there were too many of them (Flyvberg, 2004). At the same time the questions are carefully focused to keep the subject of discussion on the point of the EE-barriers and prospects of EEP's improvement.

There were a total of 44 interviews. All responders can be considered as experts and represent 3 major groups: (a) industry – 7%, (b) education and science – 36%; (c) electricity complex – 53%. Respondents, working in industry, are usually people, who are responsible for introduction of energy management systems. Respondents from group (b) are undergraduate and post-graduate students (b1) and scholars and scientists (b2), who work or study in energy related areas.

Table 2. The Questions of Survey and Barriers Addressed

Question	Barriers addressed (source of information)
Q1 – How effective are regional EE-programs?	distortion in fiscal and regulatory policy; misplaced incentives; form of information;
Q2 – How erective are local (municipal) EE-programs?	principal-agent relationship; values
Q3 – How effective are corporative EE-programs?	misplaced incentives; form of information; principal-agent relationships; values; credibility and trust; inertia; power
Q4 – How effective metering systems in reality?	technical; hidden costs
Q5 – To what extent energy audits are used in practice?	
Q6 – To what extent the data of energy audit are used in planning? (Effectiveness of energy management system introduction)	culture; perception of being already efficient; lack of expertise and competences; low priority of energy issues
Q7 – Penetration rate of ISO 50001 practical implementation	
Q8 - Access to financial sources	access to capital
Q9 – The quality of EE-training	lack of expertise and competences; values
Q10 – The quality of local (municipal) and regional EE-planning	distortion in fiscal and regulatory policy; lack of expertise and competence; inertia,
Q11 – The quality of monitoring of regional program	form of information; low priority of energy issues; perception of being already efficient
Q12 – The quality of EE-propaganda	Imperfect information; form of information;, lack of expertise and competence; values

Sources: own elaboration based on (Seligman, Becker, & Darley, 1981; Stern, 1984; Hirst & Brown, 1990; DeCanio, 1994; Nichols, 1994; Brown, 1995; Painuly & Reddy, 1996; Morgan, 1997; Hewett, 1998; Sorrell et al., 2000; Vine et al., 2003; Hatch, 2006; Thollander, Danestig, & Rohdin, 2007; Sorrell, Mallett, & Nye, 2010).

Firstly, we studied whether the respondents from different groups evaluate barriers (questions Q1-Q12) differently. Because the data was measured in weak scales, and did not meet the normal distribution and the size of the individual groups in the sample were small, the non-parametric Mann-Whitney tests were used for this purpose. The most significant difference was observed between the opinions of group b1 (students) and others. Based on the results of statistical tests, it was decided to exclude the respondents' opinions of the group (b1) on Q1-Q12 from further consideration.

According to adjusted results (Figure 5), respondents gave the highest rating to effectiveness of the metering system (Q4), effectiveness of energy audit (Q5), effectiveness of introduction of the energy management system (Q6) and the level of promotion of energy-efficiency (Q12). The lowest rating was given to the penetration rate of ISO 50001 practical implementation (Q7), access to financial sources (Q8) and the quality of training in the field of energy efficiency (Q9).

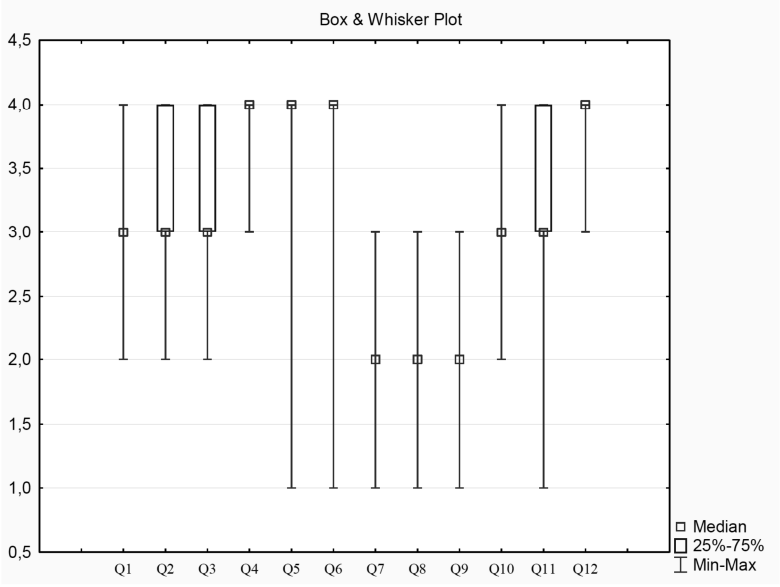

Figure 5. Adjusted Results of Survey

Source: Own elaboration.

Respondents' answers to open questions helped specify the reasons for such expert estimates as well as identify some barriers more clearly. Interestingly, each group of respondents contributed to slightly different issues and in each group we could observe a so called "saturation point" (Guest, Bunce, & Johnson, 2006), when no new issues related to the research question were emerging in new interviews.

Thus, several respondents from group (b) highlighted the fact that the climatic conditions of the region allow development of renewable energy at a much faster pace than is incorporated in the regional program indicators. Therefore, they estimated the quality of local (municipal) and regional EE-planning as quite low. Several respondents from group (a) have noticed that a high proportion of individual dwellings allow promotion of off-grid technologies, but it was never mentioned as a target in regional and local programs.

Nearly all respondents from groups (a) and (b) believe that existing economic incentives for energy-efficiency for business are weak and are absent for households. They also commended improvements of electric and gas metering systems in commercial and industrial sectors and noticed a need for improvement in heat metering systems. At the same time, respondents emphasized the lack of technical opportunities for heat regulation in residential apartment houses and offices. A majority of the Russian urban population live in big apartment houses, managed by

municipal companies and don't have many opportunities to save energy, except by reduction of personal electricity use (from the interview of a university scholar).

Respondents from all groups highlighted shortcomings in the planning and implementation of educational programs and activities. Very often people who teach, have no special knowledge in the field of energy efficiency and just tell their students the information that they have read on the internet the night before class (from the interview of a university professor). Most of the educational and training activities are populist and superficial, whereas actual statistical information on the technical and economic efficiency of selected technologies is almost impossible to find.

Respondents from groups (a) and (c) consider that the energy services market is at an early stage of development and is characterized by low competition, big information asymmetry (the consumer does not have the ability to objectively evaluate the quality of service provided) and high entry barriers. The cost of energy auditing is very high and differs a lot, even in neighbouring regions, and there is a lack of proven methods and standards of audit.

A respondent from group (a) mentioned that business in the region has not yet embraced energy efficiency as a social value, therefore not many people are interested in investing in increasing EE of their homes and companies. In some other Russian regions the situation is already different (e.g. in Belgorodskaya Oblast) because of better promotion (from the interview of the manager of a bio-gas station manufacturing and service company).

Two respondents from group (c) had experience of JI-project development and admit that there is a lack of competence in business planning and evaluation of the economic effects from renewables.

Most respondents from all groups consider that the level of energy efficiency of household and office equipment has practically no effect on the price, therefore the majority of the buyers do not pay much attention to EE indicators and tend to choose more powerful and functional home and office appliances. It can be considered as evidence of another important barrier – adverse selection (Hewett, 1998).

Nevertheless, some respondents mentioned that they started to consider EE issues since the introduction of widespread energy labelling. They admit that they had never even thought about EE before the ban on incandescent lamps and mandatory labelling of home and office appliances.

Thus, a thorough analysis of the interviews suggests that the most frequently mentioned barriers are the following: lack of expertise and competences (33), low priority of energy issues (32), imperfect information (27), form of information (27), distortion in fiscal and regulatory policy (26), access to capital (20), incomplete markets for energy efficiency (Blumstein, Krieg, Schipper, & York, 1980; Jaffe & Stavins, 1994) (19), adverse selection (14).

DISCUSSION AND CONCLUSIONS

This critical review of Russian EEP shows the major shift from a top-down to a horizontal approach to energy-efficiency issues. While the main goals of EE in fuel &energy complex are still in the focus of federal government, with other important matters transferred to regional level. It helps to deal with heterogeneity of social, economic and natural conditions and gives a chance to enjoy the results of policy-experimentation and competition. Further empowering regions to develop and implement EEP is needed. It is also very important to keep open channels for policy diffusion on international level, e.g. cooperation with IEA, international R&D projects in the area of energy management, cooperation with ISO.

Besides the shift in policy goals (from energy saving to sustainable development), the evolution of Russian EEP doesn't fit the general trend of increasing amounts of supportive policies, described in (Tanaka, 2011). Economic measures are still most prevalent category, despite the fact that many of them were not as effective as expected. Prescriptive policies are not as widespread as happens in a country with strong "command and control" traditions. Actually only FL-2009 introduced some restrictions, which influenced all sectors of the economy and resulted not so much in improving energy-efficiency, as in initiation of "mental shift" in society.

At the same time, supportive measures are poorly presented both in federal and regional EEPs. Training and information support activities in some cases fail because of lack of expertise and knowledge in individuals who are solely responsible to conduct training. This most common barrier needs to be overcome first for further improvement of energy efficiency. The convergence of expertise can happen through horizontal interactions on regional level as well as through specially organized training programs at the federal level with the participation of international experts.

In extension of supportive policies we see the biggest potential for Russian EEP improvement, because supportive measures are usually at low cost (in comparison with other measures) and increase the cost-effectiveness of the various other prescriptive and economic measures. The awareness, knowledge, tools and procedures that supportive measures foster in companies are the foundation upon which the prescriptive and economic measures operate. Moreover, supportive measures perfectly fit for dealing with most common EE-barriers on regional level, revealed in empirical study.

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EWOLUCJA ROSYJSKIEGO MAKRO-ZARZĄDZANIA – PRZYPADEK POLITYKI WYDAJNOŚCI ENERGETYCZNEJ

Abstrakt

Tło badań. W pracy przedstawiono krytyczny przegląd wykonywanych działań zarządzania na poziomie makroekonomicznym w celu zwiększenia efektywności energetycznej w Rosji w latach 1995-2013 ze szczególnym naciskiem na zmiany celów, metod oraz podejścia. Porównujemy tempo i tendencje ewolucji rosyjskiej polityki efektywności energetycznej ze światowymi trendami i omawiamy wpływ oddziaływania polityki poprzez jej dyfuzję na poziomie międzynarodowym i regionalnym.
Cele badań. Wykorzystując ramy koncepcyjne rozszerzonej luki efektywności energetycznej, niniejsza praca bada istniejące bariery w zakresie efektywności energetycznej i sugeruje możliwe rozwiązania dla poprawy polityki energetycznej na szczeblu regionalnym.
Metodyka. Zebraliśmy informacje celem oceny skuteczności obecnej polityki energetycznej poprzez badania empiryczne w postaci połączenia ankiety wykonanej twarzą w twarz na średnią skalę oraz częściowo strukturyzowanego wywiadu.
Kluczowe wnioski. Wyniki badań pokazują, że najczęstszą barierą jest brak wiedzy i kompetencji koniecznych do zidentyfikowania nieefektywności i możliwości, a także do wdrożenia środków w zakresie efektywności energetycznej, co należy najpierw przezwyciężyć w celu dalszej poprawy efektywności energetycznej. Konwergencja doświadczenia i wiedzy może nastąpić poprzez poziomą interakcję na szczeblu regionalnym, jak również za pośrednictwem specjalnie zorganizowanych programów szkoleniowych na szczeblu federacyjnym z udziałem ekspertów międzynarodowych.

Słowa kluczowe: zarządzanie energią; przegląd polityki; dyfuzja polityki; bariery